Research - Distributed Systems Research

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Abstract

Research on distributed systems concepts used in API-OSS federation.

Distributed Systems Research

Overview

Research on distributed systems concepts used in API-OSS federation.

Key Papers

Title	Author	Year	Relevance
"CRDTs: Conflict-Free Replicated Data Types"	INRIA	2011	State sync
"Gossip Protocol for Distributed Systems"	Microsoft	2007	Peer discovery
"Dynamo: Amazon's Highly Available Key-value Store"	Amazon	2007	Distributed storage
"Raft: Consensus Algorithm"	Stanford	2014	Leader election
"CAP Theorem"	Brewer	2000	Trade-offs

Concepts Applied

CRDTs

```yaml
usage: Route config synchronization
type: Last-write-wins register
benefits:
  - No conflict resolution needed
  - Eventual consistency
  - Works with network partitions
```

Gossip Protocol

```yaml
usage: Peer discovery and health monitoring
interval: 30 seconds
fanout: 3 peers per round
failure_detection: Phi accrual detector
```

CAP Trade-offs

```yaml
federation_sync:
  consistency: Eventual
  availability: High
  partition_tolerance: High

rate_limiting:
  consistency: Strong (via Redis)
  availability: High
  partition_tolerance: Degraded
```

Next

- Security Research

See Also

Related research, architecture, and whitepaper documentation.

- Research Overview
- Architecture Overview
- Whitepapers
- Performance Research